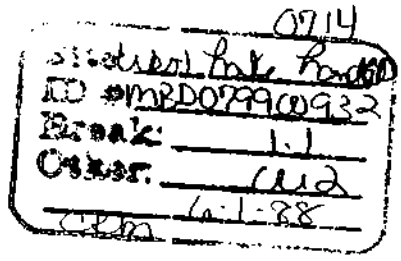
MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
LABORATORY SERVICES PROGRAM

Landfill Monitoring Report
Westlake Sanitary Landfill
St. Louis County, Missouri
June 1, 1988




## INTRODUCTION

At the request of the Waste Management Program, landfill monitoring was conducted on June 1, 1988 at the Westlake Sanitary Landfill in St. Louis County, Missouri. Sampling techniques and field analyses, performed by Engineering Survey and Services, were observed by Don Van Dyke, Randy Crawford and Eric Sappington of the Laboratory Services Program, Division of Environmental Quality.

## METHODS

Three grab samples were collected by Engineering Survey and Services personnel from monitoring wells #1201, #1202, and #1203. Sampling techniques and field analyses of the private laboratory were observed in the field and critiqued using "QA/QC Water Sampling checklist for Solid Waste Disposal Facilities" (Appendix A).

Monitoring point data and field analyses results are given in Appendix B.

The samples were split between private laboratory and State personnel for separate preservation, filtration, and field analyses for pH, temperature, and conductivity. The State's portion was returned on ice to the Division Laboratory in Jefferson City for analyses.

## OBSERVATIONS



The weather was hot and dry on the day of sampling.

The three wells were constructed of six inch steel casing.

The wells were very deep; 252, 252, and 242 feet, respectively.

Due to the volume of standing water in the wells, a pump was utilized to attempt evacuation of one well volume of water prior to sampling with a Teflon bailer.

Rust particles, from the inside of the steel casing used in construction of the wells, were observed in the samples as the bailer was drawn out of the wells.



DNR 0196

## RESULTS

See attached results for analyses performed on the samples (Appendix C).

Submitted by

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Water Quality Monitoring Unit
Laboratory Services Program

Date September 2, 1988

Approved by

James H. Long
Director
Laboratory Services Program

JHL/DVD:jrr

cc: Miles Stotts, Chief, Solid Waste Enforcement Section,
Waste Management Program

APPENDIX A

# QA/QC WATER SAMPLING CHECKLIST FOR SOLID WASTE DISPOSAL FACILITIES

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June 1, 1988

QA/QC WATER SAMPLING CHECKLIST FOR
SOLID WASTE DISPOSAL FACILITIES

Facility Name Westlake Sanitary Landfill

Date of Sampling June 1, 1988

Private Lab Name Engineering Survey and Services

Private Lab Address 1113 Fay Columbia, Missouri 65201

Private Lab Phone No. 314-449-2646

| Participants: | Name | Position Title |
|---|---|---|
| Facility: | | |
| | | |
| | | |
| | | |
| State Lab: | Randy Crawford | Supervisor WQMU |
| | Don Van Dyke | Water Quality Specialist |
| | Eric Sappington | Water Quality Specialist |
| Private Lab: | Dave Bennet | Engineer |
| | Larry Bissenden | Chemist |
| | | |
| | | |

I. General Review of Monitoring Well Sample Collection Procedures — Y/N*

A. Are monitoring wells sampled? — Y
If no, proceed to section II.

B. Monitoring Well Location and Security

1. Is a map of facility available to locate wells? — Y

2. Are monitoring wells marked so they can be located easily? — Y

3. Do monitoring wells have protective caps? — Y

4. Are protective caps locked to prevent unauthorized access? — N

C. Measurement of Well Depths

1. Are measurements of both depth to standing water and depth to bottom of well made prior to well evacuation? — Y

2. Are measurements taken to nearest inch or .1 foot? — Y

3. Type of measuring device Brainard-Hilman water level indicator and a weighted line for total depth

4. Is measuring device cleaned according to WMP guidelines? — Y

D. Well Evacuation:

1. What device is used to evacuate well? American Sigma gas driven pump with compressed air driver

2. Are low recharge wells evacuated to dryness? — N/A

3. Are high recharge well evacuated according to WMP guidelines? — N

4. Is evacuated water disposed of properly? — Y

5. Does each well have dedicated evacuation equipment? — N

6. Is well evacuation equipment cleaned according to WMP guidelines? — N

E. Sample Collection

1. Does each well have dedicated sampling equipment? — N

2. If no to above, is sampling equipment cleaned according to WMP guidelines? — N

* All No responses must be explained in Remarks Section.

| | Y/N* |
|---|---|
| 3. Is care taken to avoid placing clean sampling equipment on the ground or other contaminated surfaces prior to sample collection? | N |
| 4. Are samples collected in a manner that will minimize aeration of the sample? | N |

II. Ceneral Review of Surface Point Sample Collection Procedures

| | |
|---|---|
| A. Are surface points sampled? If no, proceed to section III. | N |
| B. Surface Point Location and Description | |
| 1. Is a map of facility available to locate sampling points? | N/A |
| 2. Are sampling points marked so sampling will always occur at same location? | N/A |
| 3. If a stream, is presence or absence of flow recorded? | N/A |
| 4. Are water level conditions (above/below normal) noted? | N/A |
| C. Sample Collection | |
| 1. Does each surface point have dedicated sampling equipment? | N/A |
| 2. Is care taken to avoid placing clean sampling equipment on ground, or otherwise contaminating equipment prior to sample collection? | N/A |
| 3. Are samples collected in a manner consistent with WMP guidelines? | N/A |

III. Review of Field Measurements, Sample Handling and Preservation Procedures

| | |
|---|---|
| A. Field Measurements | |
| 1. Are the following parameters measured in the field: | |
| a. pH? | Y |
| b. temp.? | N |
| c. specific conductivity? | Y |
| d. other (specify) | N/A |
| 2. Is equipment calibrated and maintained according to accepted procedures? | Y |

* All No responses must be explained in Remarks Section.

| | Y/N* |
|---|---|
| 3. Are field measurements determined using methods consistent with accepted procedures? | Y |
| 4. Are field measurements made on a split portion of sample rather than in a container that will be analyzed for other parameters? | N |

B. Sample Containers

| | |
|---|---|
| 1. Are sample containers for each parameter compatible and consistent with WMP guidelines? | Y |

C. Sample Handling and Preservation

| | |
|---|---|
| 1. Are samples transferred from the sampling device directly to the appropriate containers? | Y |
| 2. Are samples containerized in order of their volatilization sensitivity? | N/A |
| 3. Are parameters requiring field filtration filtered immediately after sample collection through a 0.45 micron filter? | N |
| 4. Are samples preserved according to WMP approved guidelines? | Y |

IV. Review of Field Documentation and Sample Chain-of-Custody Procedures

A. Samples documentation:

| | |
|---|---|
| 1. Are sample labels used? | Y |
| 2. Do they remain attached and legible even if wet? | Y |
| 3. Are labels attached immediately after samples are collected? | Y |

* All No responses must be explained in Remarks Section.

| | Y/N* |
|---|---|
| B. Site Information | |
| 1. Is a field logbook maintained? | Y |
| 2. Does it contain the following information: | |
| a. time and date of well evacuation and sampling? | Y |
| b. weather conditions at time of sampling? | Y |
| c. well identification number? | Y |
| d. total depth of each well? | Y |
| e. static water level depth? | Y |
| f. well yield - high or low? | Y |
| g. well sampling sequence? | Y |
| h. field analysis data? | Y |
| i. field team members? | Y |
| j. unusual conditions or observations? | Y |
| C. Chain-of-Custody Record | |
| 1. Is a Chain-of-Custody record included with each sample? | N |

* All No responses must be explained in Remarks Section.

V. Remarks (any No responses in above should be accompanied by an explanation in this section).

I.B.4. Wells are located in a fenced area with a locked gate.

I.D.3. Due to the depth and large volume of standing water in each well the normal procedure followed by the contract lab is to remove one volume from each well. The time needed to remove one volume varied for each well from 1.5 to 3.0 hours. The volume of water removed was calculated based on elapsed time and estimated pumping rate rather than actual measurement.

I.D.5. A common pump was used to purge all wells.

I.D.6. The evacuation pump and associated accessories were not sufficiently cleaned to prevent cross-contamination.

I.E.1. A common bailer was used for well sampling.

I.E.2. The same bailer rope was used for all sampling and was not cleaned between wells.

I.E.3. The bailer rope was allowed to come in contact with the ground.

I.E.4. Faulty bailer valves probably allowed aeration of the samples.

II.A.1. There are no surface points to be sampled.

III.a.1.b. No temperature measurments were made.

III.A.4. Field measurements were made on the sample portion designated for lab analysis.

III.C.3. Field filtration was not performed.

IV.C.1. No Chain-of-Custody record was kept.

# APPENDIX B

## MONITORING POINT DATA AND FIELD ANALYSES RESULTS

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Landfill Monitoring Point Data Sheet For Westlake Sanitary Landfill

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Number | | 88-0577 | | 88-0578 | | 88-0576 | | | |
| Monitoring Point | | 1201 | | 1202 | | 1203 | | | |
| Well or Surface | | Well | | Well | | Well | | | |
| Date Evacuated | | 06/01/88 | | 06/01/88 | | 06/01/88 | | | |
| Date Sampled | | 06/01/88 | | 06/01/88 | | 06/01/88 | | | |
| Well Diameter (in.) | | 6 | | 6 | | 6 | | | |
| Depth to Water Surface (ft.) | | 185.27' | | 190.56' | | 114.96' | | | |
| Depth to Bottom (ft.) | | 252 | | 252 | | 242 | | | |
| Length of Water Column (ft.) | | 66.73 | | 61.44 | | 127.04 | | | |
| Volume of Water in Well (gal.) | | N/A | | N/A | | N/A | | | |
| Volume of Water Evacuated (gal) | | 98.0 | | 90.24 | | 186.60 | | | |
| Evacuate to Dryness Y/N | | N | | N | | N | | | |
| Fast Recharge Y/N | | Y | | Y | | Y | | | |
| Color | | Clear | | Rusty | | Clear | | | |
| Odor | | Petroleum | | Petroleum | | Petroleum | | | |
| | | LSP | Private | LSP | Private | LSP | Private | LSP | Private |
| Initial | pH | 7.65 | N/A | 7.17 | N/A | 9.05 | N/A | | |
| | temp °C | 19.3 | N/A | 21.9 | N/A | 20.4 | N/A | | |
| | cond | 820 | N/A | 760 | N/A | 400 | N/A | | |
| After one well volume evacuated | pH | 7.12 | 7.2 | 7.02 | 7.20 | 9.66 | 9.6 | | |
| | temp °C | 17.5 | N/A | 18.0 | N/A | 16.7 | N/A | | |
| | cond | 800 | 820 | 740 | 730 | 380 | 455 | | |
| After two well volumes evacuated | pH | N/A | N/A | N/A | N/A | N/A | N/A | | |
| | temp °C | N/A | N/A | N/A | N/A | N/A | N/A | | |
| | cond | N/A | N/A | N/A | N/A | N/A | N/A | | |
| After three well volumes evacuated | pH | N/A | N/A | N/A | N/A | N/A | N/A | | |
| | temp °C | N/A | N/A | N/A | N/A | N/A | N/A | | |
| | cond | N/A | N/A | N/A | N/A | N/A | N/A | | |

Comments and Observations:

# APPENDIX C

## ANALYTICAL RESULTS

Landfill Monitoring Report
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St. Louis County, Missouri
June 1, 1988

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 88-0577

Reported to: DONALD VAN DYKE
Affiliation: WQM

Date: 8/10/88
Project Code: 3511/3000

Sample Description:
WESTLAKE SANITARY LANDFILL - ST. LOUIS CO.
WELL #1201
GRAB

Collected by: DONALD VAN DYKE
Affiliation: WQM

Date: 06/01/88

| PARAMETERS | RESULTS |
|---|---|
| TOTAL DISS SOLIDS | 560 mg/L |
| TEMPERATURE<br>COMMENTS : ANALYZED IN FIELD | 17.5 DEGREES C |
| pH<br>COMMENTS : ANALYZED IN FIELD | 7.12 |
| SPECIFIC CONDUCTANCE<br>COMMENTS : ANALYZED IN FIELD | 800 uMhos/cm |
| HARDNESS AS CaCO3 | 440 mg/L |
| CHEMICAL OXYGEN DEMAND | 6 mg/L |
| FLUORIDE | 0.48 mg/L |
| AMMONIA | <0.05 mg/L |
| NITRITE-NITRATE | 0.09 mg/L |
| TOTAL PHOSPHOROUS | 0.22 mg/L |
| SULFATE | 96 mg/L |
| CHLORIDE | 44 mg/L |

| PARAMETERS | RESULTS |
|---|---|
| DISS. SILVER | <10 ug/L |
| DISS. ARSENIC | <5 ug/L |
| DISS. BORON | <170 ug/L |
| DISS. BARIUM | 130 ug/L |
| DISS. CALCIUM | 110 mg/L |
| DISS. CADMIUM | <10 ug/L |
| DISS. COBALT | <60 ug/L |
| DISS. CHROMIUM | <20 ug/L |
| DISS. COPPER | <10 ug/L |
| DISS. IRON | 30 ug/L |
| DISS. MERCURY | <.5 ug/L |
| DISS. MAGNESIUM | 41 mg/L |
| DISS. MANGANESE | 60 ug/L |
| DISS. SODIUM | 17 mg/L |
| DISS. LEAD | <40 ug/L |
| DISS. SELENIUM | <146 ug/L |
| DISS. ZINC | 22 ug/L |

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 88-0578

Reported to: DONALD VAN DYKE
Affiliation: WQM

Date: 8/16/88
Project Code: 3511/3000

Sample Description:
WESTLAKE SANITARY LANDFILL - ST. LOUIS CO.
WELL #1202
GRAB

Collected by: DONALD VAN DYKE
Affiliation: WQM

Date: 06/01/88

| PARAMETERS | RESULTS |
|---|---|
| TOTAL DISS SOLIDS | 490 mg/L |
| TEMPERATURE<br>COMMENTS : ANALYZED IN FIELD | 18 DEGREES C |
| pH<br>COMMENTS : ANALYZED IN FIELD | 7.02 |
| SPECIFIC CONDUCTANCE<br>COMMENTS : ANALYZED IN FIELD | 740 uMhos/cm |
| HARDNESS AS CaCO3 | 380 mg/L |
| CHEMICAL OXYGEN DEMAND | 38 mg/L |
| FLUORIDE | 1.46 mg/L |
| AMMONIA | <0.05 mg/L |
| NITRITE-NITRATE | 0.16 mg/L |
| TOTAL PHOSPHOROUS | 0.87 mg/L |
| SULFATE | 89 mg/L |
| CHLORIDE | 36 mg/L |

Sample no. 88-0578
Date 8/16/88

| PARAMETERS | RESULTS |
|---|---|
| DISS. SILVER | <10 ug/L |
| DISS. ARSENIC | <5 ug/L |
| DISS. BORON | <170 ug/L |
| DISS. BARIUM | <130 ug/L |
| DISS. CALCIUM | 91 mg/L |
| DISS. CADMIUM | <10 ug/L |
| DISS. COBALT | <60 ug/L |
| DISS. CHROMIUM | <20 ug/L |
| DISS. COPPER | <10 ug/L |
| DISS. IRON | <20 ug/L |
| DISS. MERCURY | <.5 ug/L |
| DISS. MAGNESIUM | 37 mg/L |
| DISS. MANGANESE | <20 ug/L |
| DISS. SODIUM | 14 mg/L |
| DISS. LEAD | <40 ug/L |
| DISS. SELENIUM | <146 ug/L |
| DISS. ZINC | 21 ug/L |

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 88-0576

Reported to: DONALD VAN DYKE
Affiliation: WQM

Date: 8/10/88
Project Code: 3511/3000

Sample Description:
WESTLAKE SANITARY LANDFILL - ST. LOUIS CO.
WELL #1203
GRAB

Collected by: DONALD VAN DYKE
Affiliation: WQM

Date: 06/01/88

| PARAMETERS | RESULTS |
|---|---|
| TOTAL DISS SOLIDS | 250 mg/L |
| TEMPERATURE<br>COMMENTS : ANALYZED IN FIELD | 16.7 DEGREES C |
| pH<br>COMMENTS : ANALYZED IN FIELD | 9.66 |
| SPECIFIC CONDUCTANCE<br>COMMENTS : ANALYZED IN FIELD | 380 uMhos/cm |
| HARDNESS AS CaCO3 | 43 mg/L |
| CHEMICAL OXYGEN DEMAND | 7 mg/L |
| FLUORIDE | 1.01 mg/L |
| AMMONIA | <0.05 mg/L |
| NITRITE-NITRATE | 0.28 mg/L |
| TOTAL PHOSPHOROUS | 0.12 mg/L |
| SULFATE | 80 mg/L |
| CHLORIDE | 7 mg/L |

| PARAMETERS | RESULTS |
|---|---|
| DISS. SILVER | <10 ug/L |
| DISS. ARSENIC | <5 ug/L |
| DISS. BORON | <170 ug/L |
| DISS. BARIUM | <130 ug/L |
| DISS. CALCIUM | 11 mg/L |
| DISS. CADMIUM | <10 ug/L |
| DISS. COBALT | <60 ug/L |
| DISS. CHROMIUM | <20 ug/L |
| DISS. COPPER | <10 ug/L |
| DISS. IRON | 20 ug/L |
| DISS. MERCURY | <.5 ug/L |
| DISS. MAGNESIUM | 3.7 mg/L |
| DISS. MANGANESE | <20 ug/L |
| DISS. SODIUM | 30 mg/L |
| DISS. LEAD | <40 ug/L |
| DISS. SELENIUM | <146 ug/L |
| DISS. ZINC | <10 ug/L |